MOBIES PI Meeting
New York City

- Cost Reduction Analysis and Challenge Problems
  - Ken Henry, GM R&D and Planning
- Subcontractors: None
- GM contractor: New Eagle Software
- Contract end: 30 June 2004

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MOBIES PI Meeting

- Problem Description/Objective
  - Contribute challenge problems/requirements and support their development
  - Conduct baseline technology evaluations - remedial
  - Establish GM internal experimental platform
  - Evaluate new MoBIES technologies
  - Develop realistic assessment of MoBIES potential in industry

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MOBIES PI Meeting

- Industry perspective – GM R&D
  - Vision
  - Background – baselines studies and GM platform
  - Requirements for new technology
  - Preliminary assessment of MoBIES technologies
  - Cost reduction potential
  - Other concerns

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MOBIES PI Meeting

- Long term vision is that MoBIES will contribute to …
  - Systems (mechatronics) engineering on the vehicle level
  - Cost management – "linear" rise with vehicle system complexity
  - Optimized development process for product lifecycle
    - Maximized virtual (workstation) engineering
    - Unified hardware/software/controls design
    - Minimized, focused hardware testing
  - Optimized primary toolset with open interfaces
  - Verification/validation woven into all process steps

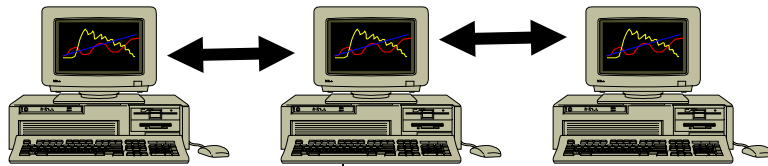7/24/2002

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Baseline Evaluations

- New Eagle Software (Ann Arbor, MI) contracted to …
  - Assess state-of-the-art in automated software synthesis and software testing
  - Support development of GM Experimental Platform
  - Evaluation of MoBIES technologies
  - Evaluation of alternative development environments
- Interim Results
  - Software synthesis eval ongoing
  - Trial evaluation of Reactive Systems product for testing

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GM MoBIES Platform

Opal-RT

Powertrain Simulator (microAutoBox)	Vehicle Simulator (microAutoBox)

CAN

Engine Controller (MPC555)	Body/Chassis Control (MPC555)	ETC Controller (MPC555) →	Custom Functions 68HC12

TTP/C

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GM Experimental Platform

- Test Bed status
  - Opal-RT software/hardware functional
  - TTTech hardware/software partially functional
- Challenges
  - Both tools require changes to Simulink models
  - Models of computation not yet verified
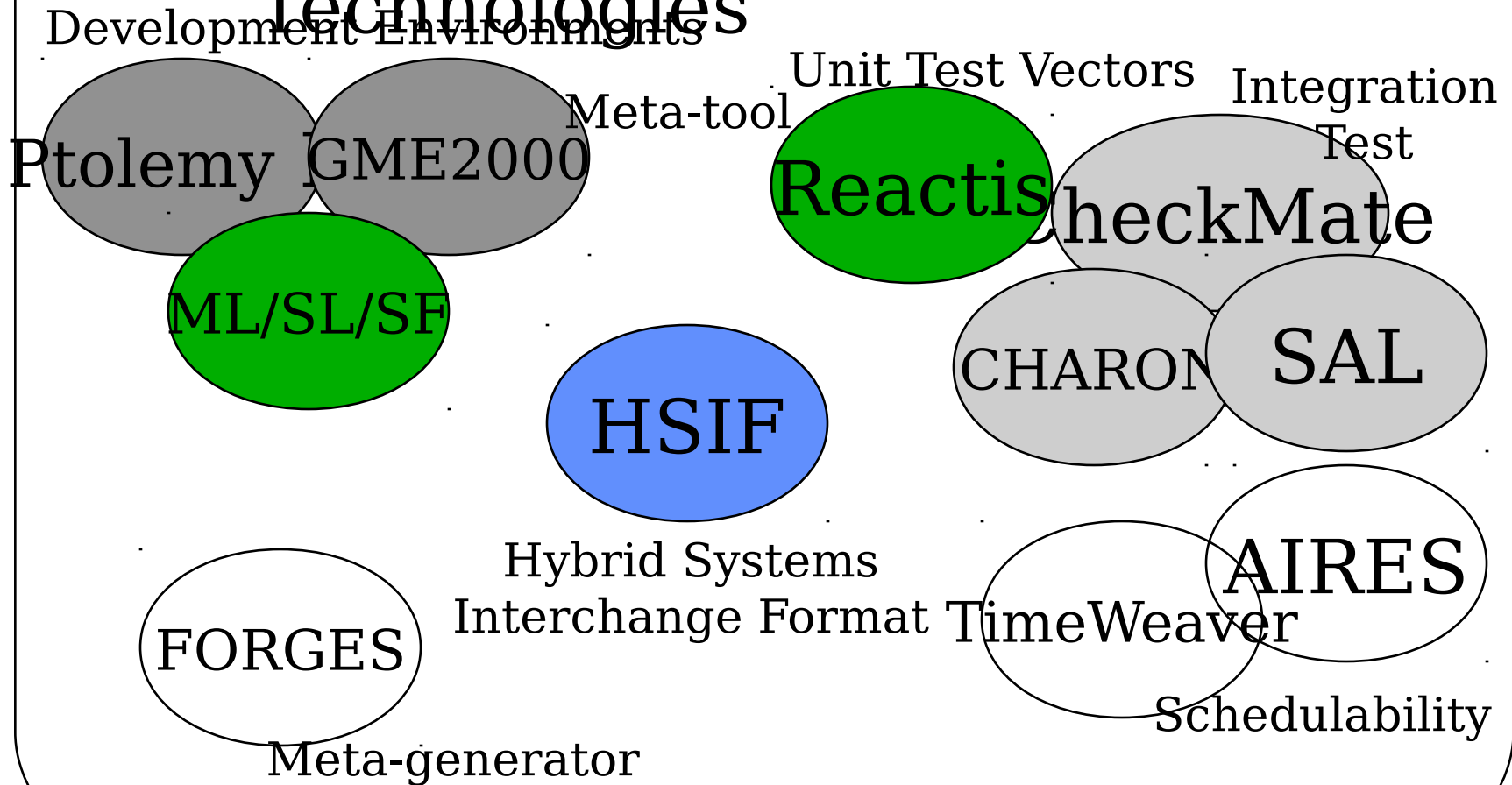 - Open interfaces?

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MOBIES – Success Criteria

- Cost savings
- Time savings
- Quality improvement
- Scaleability to large problems
- Adaptable/interfaceable to current process/tools

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DARPA MoBIES Technologies

Development Environments

Unit Test Vectors

Integration Test

Meta-tool

Ptolemy

GME2000

Reactis

CheckMate

ML/SL/SF

CHARON

SAL

HSIF

Hybrid Systems Interchange Format

AIRES

FORGES

TimeWeaver

Schedulability

Meta-generator

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Tool	Experience	Outlook	
Aires	New Eagle eval		
Charon	Viewed demo	Unix	
Checkmate	Exercised demo	+ +	
GME	Exercised demos	+	
FORGES	Sample model	+	
HSIF	Following progress	+ +	
Ptolemy II	Exercised demos; eval	+	
SAL	No	Unix	

Cost Reduction Potential

- Assess MoBIES impact on first and second order effects
- First order effects
  - Verification/validation of subsystems
- Second order effects – integration
  - Composability tools ?
- Too early to make a meaningful estimate

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Other Concerns

- Multiple development domains
- Mil/Aero – Automotive split
- Tool scaleability
- Legacy software transitions
- Underestimated role of plant models

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